MISSION CREEK WATER ASSOCIATION (PWSNO 1110019)
SOURCE WATER ASSESSMENT REPORT

March 26, 2003

State of Idaho
Department of Environmental Quality

Executive Summary

Under the Safe Drinking Water Act Amendments of 1996, all states are required by the U.S. Environmental Protection Agency to assess every source of public drinking water for its relative sensitivity to contaminants regulated by the act. This risk assessment is based on a land use inventory in the recharge zone, sensitivity factors associated with how the source was constructed, and aquifer characteristics.

This report, *Source Water Assessment for the Mission Creek Water Association*, describes the public drinking water well; the well recharge zone and potential contaminant sites located inside the recharge zone boundaries. This assessment, taken into account with local knowledge and concerns, should be used as a planning tool to develop and implement appropriate protection measures for this public water system. **The results should not be used as an absolute measure of risk and they should not be used to undermine public confidence in the water system.**

The Mission Creek Water Association, located on the east side of the Kootenai River about 8 miles south of Porthill, Idaho operates a community water system with 35 connections. The system has a single 309-foot deep well that supplies drinking water to 125 people in rural Boundary County (Figure 1).

Mission Creek Water Association drilled the well in 1998 to replace a surface water source. The well has had no persistent water quality problems other than elevated uranium concentrations from erosion of natural mineral deposits in the l area. A susceptibility analysis conducted by the Idaho Department of Environmental Quality on January 28, 2003, concluded that the well is at low risk of becoming contaminated with inorganic, synthetic, and volatile organic chemicals or microbial contaminants.

This assessment should be used as a basis for determining appropriate new protection measures or re-evaluating existing protection efforts. No matter what ranking a source receives, protection is always important. Whether the source is currently located in a "pristine" area or an area with numerous industrial and/or agricultural land uses that require education and surveillance, the way to ensure good water quality in the future is to act now to protect valuable water supply resources.

Continuing to operate and maintain the well in compliance with the *Idaho Rules for Public Drinking Water Systems* is the most important drinking water protection tool available to the Mission Creek Water Association. The system should develop a water emergency response plan, and contingency plans in the event that treatment for reduction of the uranium concentration becomes necessary. The system is already planning to develop a second well when funds become available.

Due to the time involved with the movement of ground water, source water protection activities should be aimed at long-term management strategies even though these strategies may not yield results in the near term. For assistance in developing protection strategies, please contact your regional Department of Environmental Quality office or the Idaho Rural Water Association.

SOURCE WATER ASSESSMENT FOR MISSION CREEK WATER ASSOCIATION

Section 1. Introduction - Basis for Assessment

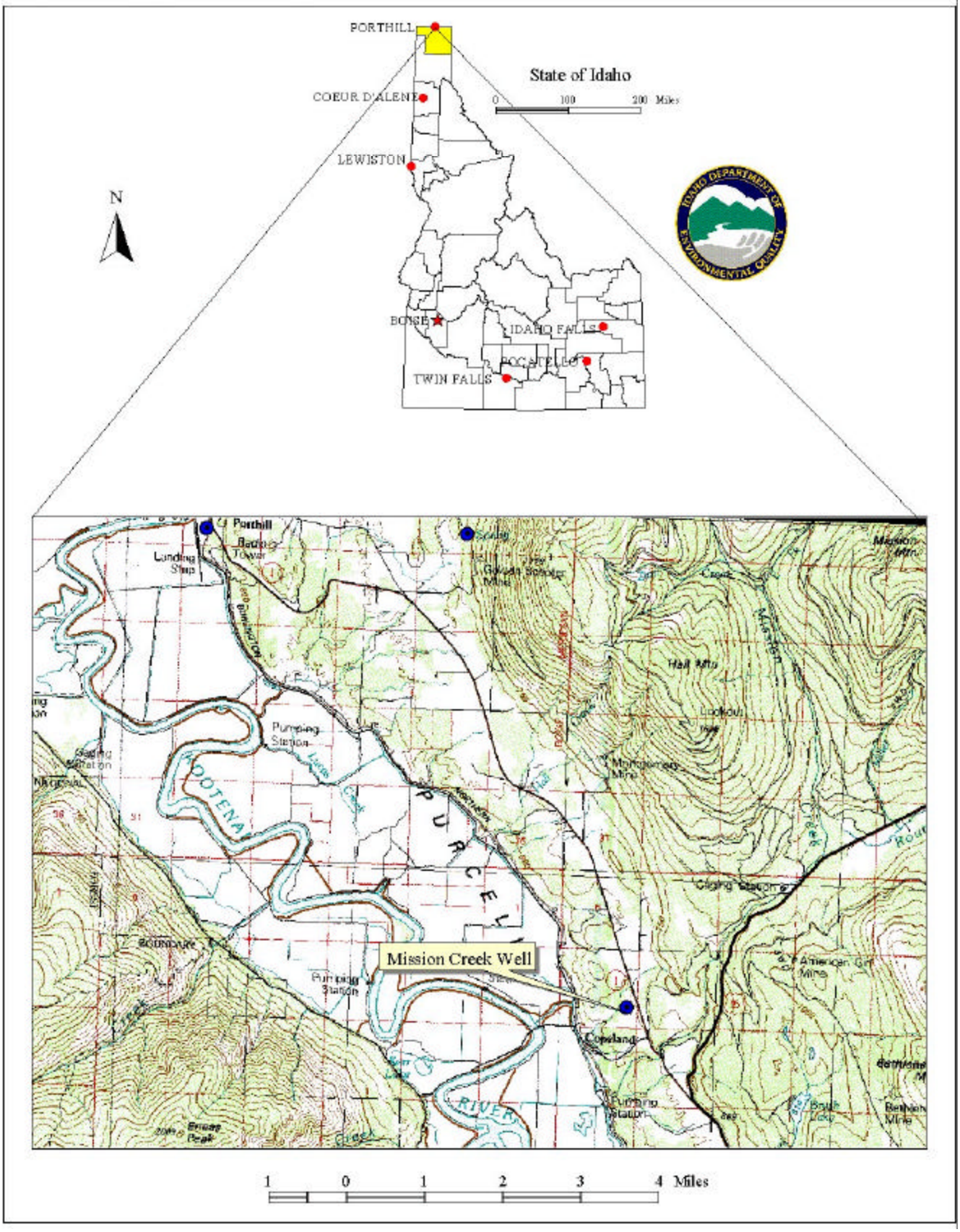
The following sections contain information necessary for understanding how and why this assessment was conducted. **It is important to review this information to understand what the ranking of this source means.** A map showing the delineated source water assessment area and an inventory of significant potential sources of contamination identified within that area are included. The ground water Susceptibility Analysis Worksheet used to develop this assessment is attached.

Level of Accuracy and Purpose of the Assessment

The Idaho Department of Environmental Quality (DEQ) is required by the U.S. Environmental Protection Agency (EPA) to assess every public drinking water source in Idaho for its relative susceptibility to contaminants regulated by the Safe Drinking Water Act. These assessments are based on a land use inventory inside the delineated recharge zones, sensitivity factors associated with how the well is constructed, and aquifer characteristics. The state must complete more than 2900 assessments by May of 2003. Because resources and the time available to accomplish assessments are limited, an in-depth, site-specific investigation for every public water system is not possible.

The results of the source water assessment should not be used as an absolute measure of risk and they should not be used to undermine public confidence in the water system. The ultimate goal of this assessment is to provide data to local communities for developing a protection strategy for their drinking water supply. The Idaho Department of Environmental Quality recognizes that pollution prevention activities generally require less time and money to implement than treating a public water supply system once it has been contaminated. DEQ encourages communities to balance resource protection with economic growth and development. The decision as to the amount and types of information necessary to develop a source water protection program should be determined by the local community based on its own needs and limitations. Wellhead or source water protection is one facet of a comprehensive growth plan, and it can complement ongoing local planning efforts.

Figure 1. Geographic Location of Mission Creek Water Association



Section 2. Preparing for the Assessment

Defining the Zones of Contribution - Delineation

The delineation process establishes the physical area around a well that will become the focal point of the assessment and future protection efforts. The process includes mapping the boundaries of the well recharge area into time of travel zones indicating the number of years necessary for a particle of water flowing through the aquifer to reach a well. The ground water flow model incorporated data DEQ assimilated from a variety of sources including local well logs and pumping volume estimates for the Mission Creek Water Association well.

One ground water source was delineated. The well is 309 feet deep with a static water level of 43 feet and is completed in fractured granitic rock. The pumping volume (4011 ft^3/day) was estimated from a population served of 125. Based on the reported static water elevation the saturated thickness was assumed to be 265 feet. The gradient of 0.06 was estimated using a well located northeast of the source and the source itself. Hydraulic conductivity estimates ranged between 1 and 3 feet per day.

Based on these assumptions and using a hydraulic conductivity value of 3 feet per day (which produced the longest capture zones) the lengths of the 3, 6 and 10 year time of travel zones were estimated to be 2038, 4018, and 6653 feet, respectively. The time of travel zones were rotated to accommodate uncertainty due to the mountainous terrain and uncertainty regarding the direction of ground water flow The resulting delineation ranges from northeast to east, with the assumption being the ground water system is moving toward the Kootenai River as a discharge location. Figure 2 illustrates the capture zone for the system.

Identifying Potential Sources of Contamination

The goal of the inventory process is to locate and describe those facilities, land uses, and environmental conditions that are potential sources of ground water contamination. Inventories for all public water systems in Idaho were conducted in two-phases. The first phase involved identifying and documenting potential contaminant sources within a system's source water assessment area through the use of computer databases and Geographic Information System maps developed by DEQ. Maps showing the delineations and tables summarizing the results of the database search were then sent to system operators for review and correction during the second or enhanced phase of the inventory process.

Many potential sources of contamination are regulated at the federal level, state level, or both to reduce the risk of release. When a business, facility, or property is identified as a potential contaminant source, this should not be interpreted to mean that this business, facility, or property is in violation of any local, state, or federal environmental law or regulation. What it does mean is that the potential for contamination exists due to the nature of the business, industry, or operation.

Section 3. Susceptibility Analysis

The susceptibility to contamination of all ground water sources in Idaho is being assessed on the following factors:

- physical integrity of the well,
- hydrologic characteristics,
- land use characteristics, and potentially significant contaminant sources
- historic water quality

The susceptibility rankings are specific to a particular potential contaminant or category of contaminants. A high susceptibility rating relative to one potential contaminant does not mean that the water system is at the same risk for all other potential contaminants. The relative ranking that is derived for each well is a qualitative, screening-level step that, in many cases, uses generalized assumptions and best professional judgement. The following summaries describe the rationale for the susceptibility ranking. The Susceptibility Analysis Worksheet for the Mission Creek Water Association well in Attachment A shows in detail how the well scored.

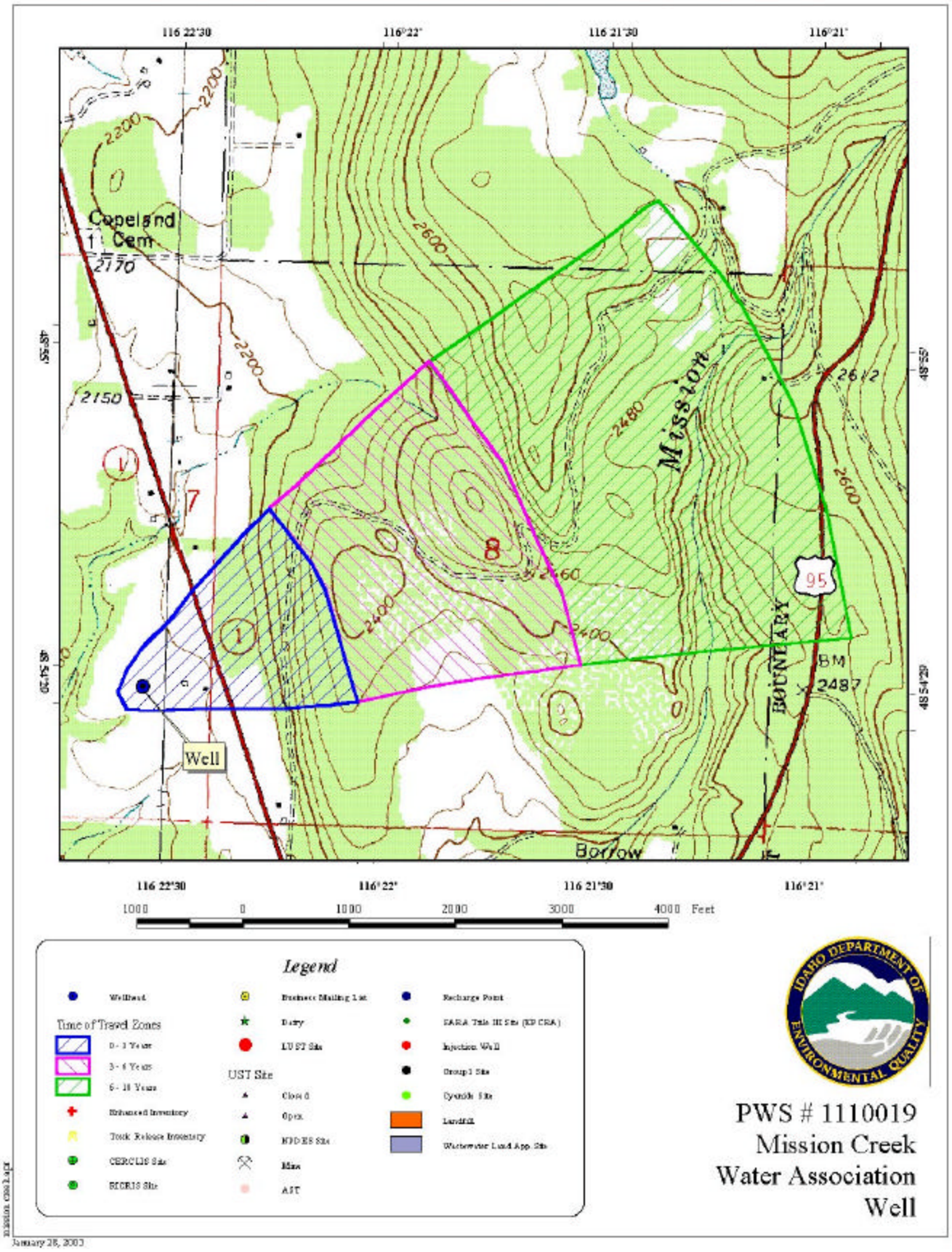
Well Construction

Construction features directly affect the ability of the well to protect the aquifer from contaminants. Lower scores imply a well that can better protect the water. This portion of the susceptibility analysis relies on information from individual well logs and from the most recent sanitary survey of the public water system. When the water system was inspected in September it was being operated and maintained in full compliance with the *Idaho Rules for Public Water Systems.*

The Mission Creek Water Association well was drilled in March 1998 to a depth of 309 feet. The well is cased with 0.25 -inch thick, 8 inch diameter steel that extend from 2 feet above grade to 224 feet below ground surface. The remaining depth of the well bore is free standing in granite. Current Idaho Department of Water Resources well construction standards specify a minimum 0.322-inch wall thickness for 8-inch steel casing. The surface seal is 25 feet deep, terminating in clay. The well log reports the static water level at 43 feet below land surface. The most productive level of the well is in a seam of soft brown decomposed granite extending from 268 to 274 feet that yields 75 gallons per minute.

The well is about a mile east of the Kootenai River and on the bench above the flood plain. The nearest creek is approximately 600 feet west of the well. A site inspection and records review in June 1999 concluded that the well is not surface water influenced.

Figure 2. MIssion Creek Water Association Delineation and Potential Contaminant Inventory.



Hydrologic Sensitivity

Hydrologic sensitivity scores reflect natural geologic conditions at the well site and in the recharge zone. Information for this part of the analysis is derived from individual well logs and from the soil drainage classification inside the delineation boundaries. The Mission Creek Water Association well scored 1 point out of 6 points possible in the hydrologic sensitivity portion of the susceptibility analysis.

Soils in the recharge zone for the well are generally poorly to moderately well drained. Soils that drain slowly are deemed more protective of ground water than rapidly draining soil. At the well site 100 feet of clay cover the underlying granite formation. This deep clay bed protects the ground water from vertical transport of contaminants. First water was encountered in a silty clay stratum 100 to 103 feet below the surface.

Potential Contaminant Sources and Land Use

Land use in the area of contribution delineated for the Mission Creek Water Association well is primarily agricultural in the 0-3 and 3-6 year time of travel zones with undeveloped forest in the 6-10 year TOT. The well and pump house are in an open field with a tree farm about 100 feet to the north and an area where cattle graze about 200 feet to the east. Highway 1 crosses the delineation boundaries about 750 feet east of the well. Highway 95 crosses the 6-10 year time of travel zone. As heavily traveled trucking routes, the highways are potential sources of every class of regulated contaminant. No other potential contaminant sites are documented inside the delineation.

Historic Water Quality

Historically, the Mission Creek Water Association well has had no persistent water quality problems other than elevated uranium concentrations in the ground water from erosion of natural deposits in the vicinity. Total coliform bacteria present in samples tested in October 1998, November 1999 and October 2001 were apparently confined to the distribution system. Total coliform samples in the intervening months were negative. The presence of the solvent toluene, a volatile organic chemical detected in a sample in March 1998, was probably related to construction activity. It has not been detected in subsequent samples. Chemical and radiological sampling results for the Mission Creek Water Association well are summarized on the table below.

Table 1. Mission Creek Water Association Chemical Sampling Results

Primary IOC Contaminants (Mandatory Tests)							
Contaminant	MCL (mg/l)	Results (mg/l)	Dates	Contaminant	MCL (mg/l)	Results (mg/l)	Dates
Antimony	0.006	ND	3/31/98, 4/17/01, 6/1801	Nitrate	10	ND	3/31/98 through 6/18/02
Arsenic	0.01	ND	3/31/98, 4/17/01, 6/1801	Nickel	N/A	ND	3/31/98, 4/17/01, 6/1801
Barium	2.0	ND	3/31/98, 4/17/01, 6/1801	Selenium	0.05	ND	3/31/98, 4/17/01, 6/1801
Beryllium	0.004	ND	3/31/98, 4/17/01, 6/1801	Sodium	N/A	32.5 to 37.9	3/31/98, 4/17/01, 6/1801
Cadmium	0.005	ND	3/31/98, 4/17/01, 6/1801	Thallium	0.002	ND	3/31/98, 4/17/01, 6/1801
Chromium	0.1	ND	3/31/98, 4/17/01, 6/1801	Cyanide	0.02	ND	3/31/98, 4/17/01, 6/1801
Mercury	0.002	ND	3/31/98, 4/17/01, 6/1801	Fluoride	4.0	ND	3/31/98, 4/17/01, 6/1801

Table 1. Mission Creek Water Association Chemical Sampling Results continued

Regulated and Unregulated Synthetic Organic Chemicals		
Contaminant	Results	Dates
29 Regulated and 13 Unregulated Synthetic Organic Compounds	None Detected	3/31/98, 8/27/01

Regulated and Unregulated Volatile Organic Chemicals		
Contaminant	Results	Dates
21 Regulated And 16 Unregulated Volatile Organic Compounds	None Detected except as noted below	3/31/98, 8/27/01
Toluene (MCL = 1000 µg/l)	1.42 µg/l	3/31/98

Radiological Contaminants			
Contaminant	MCL	Results	Dates
Gross Alpha, Including Ra & U	15 pC/l	23.0 pC/l (Distribution) 35.9 pC/l (Well)	3/31/98 9/8/02
Uranium	30µg/l	46 µg/l, 0.038 mg/l	10/2/98, 9/8/2002
Gross Beta Particle Activity	4 mrem/year	16.0 mrem (Distribution) 36.4 mrem (Well)	3/31/98 9/8/02

Final Susceptibility Ranking

The Mission Creek Water Association Mission Creek Water Association well is at low risk relative to all classes of chemical and microbial contaminants regulated under the Safe Drinking Water Act. The uranium concentration in the tested well water exceeds the 30 µg/l Maximum Contaminant Level.

Total scores for system construction and hydrologic sensitivity along with the cumulative scores for land use and potential contaminant sites are shown on Table 2. The complete Susceptibility Analysis Worksheet for the Mission Creek Water Association well is in Attachment A.

The final scores for the susceptibility analysis were determined using the following formulas:

1) VOC/SOC/IOC Final Score = Hydrologic Sensitivity + System Construction + (Potential Contaminant/Land Use x 0.2)
2) Microbial Final Score = Hydrologic Sensitivity + System Construction + (Potential Contaminant/Land Use x 0.35)

The final ranking categories are as follows:

- 0 - 5 Low Susceptibility
- 6 - 12 Moderate Susceptibility
- > 13 High Susceptibility.

Table 2. Summary of Mission Creek Water Association Susceptibility Evaluation

Cumulative Susceptibility Scores						
Well Name	System Construction 0-6 possible	Hydrologic Sensitivity 0-6 possible	Contaminant Inventory plus Land Use			
			IOC 0-30 possible	**VOC** 0-30 possible	**SOC** 0-30 possible	**Microbial** 0-14 possible
Well #1	1	1	7	7	7	4

Final Susceptibility Scores/Ranking				
Well Name	IOC 0-18 possible	VOC 0-18 possible	SOC 0-18 possible	Microbial 0-15 possible
Well #1	3/Low	3/Low	3/Low	4/Low

Low numbers are favorable because high scores indicate increased susceptibility to contaminants
IOC = inorganic chemical, VOC = volatile organic chemical, SOC = synthetic organic chemical

Section 4. Options for Source Water Protection

The susceptibility assessment should be used as a basis for determining appropriate new protection measures or re-evaluating existing protection efforts. No matter what the susceptibility ranking a source receives, protection is always important. Whether the source is currently located in a "pristine" area or an area with numerous industrial and/or agricultural land uses that require education and surveillance, the way to ensure good water quality in the future is to act now to protect valuable water supply resources.

Mission Creek Water Association already has some important drinking water protections in place for its well. The Association leases the land around the well and has a well-constructed, locked pump house. The Association should consider fencing the well lot to keep cattle and inadvertent application of agricultural chemicals at least 50 feet from the well. The water system was being operated and maintained in full compliance with the *Idaho Rules for Public Drinking Water Systems* when it was inspected in 1996. Water quality monitoring is up to date.

Mission Creek Water Association should develop a written water emergency response plan. There is a simple fill-in-the-blanks form available on the DEQ website (www.deq.state.id.us/water/water1.htm) to guide systems through the process. A contingency plan that takes future needs into account would also be useful. The Association is already accumulating funds for development of a back up well. Some form of treatment may become necessary for reduction of the uranium concentration in the water prior to distribution.

Assistance

Public water suppliers and users may call the following IDEQ offices with questions about this assessment and to request assistance with developing and implementing a local protection plan. In addition, draft protection plans may be submitted to the IDEQ office for preliminary review and comments. Water suppliers serving fewer than 10,000 persons may contact Melinda Harper of the Idaho Rural Water Association (208) 343-7001for assistance with drinking water protection strategies.

Idaho Department of Environmental Quality

Coeur d'Alene Regional IDEQ Office	(208) 769-1422
State IDEQ Office, Boise	(208) 373-0502
Website:	http://www.deq.state.id.us/

Idaho Rural Water Association

Melinda Harper, Groundwater Protection Specialist	(800) 962-3257
Website:	http://www.idahoruralwater.com

Idaho Association of Soil Conservation Associations

Water quality and soil conservation	(208) 338-5900
Website:	http://www.iascd.state.id.us/

References Cited

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Great Lakes-Upper Mississippi River Board of State and Provincial Public Health and Environmental Managers, 1997. "Recommended Standards for Water Works."

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Idaho Division of Environmental Quality, 1999, Idaho Source Water Assessment Plan, October, 39 p.

Idaho Division of Environmental Quality, 1997, Idaho Wellhead Protection Plan, Idaho Wellhead Protection Work Group, February.

Idaho Department of Water Resources, 1993. Administrative Rules of the Idaho Water Resource Board: Well Construction Standards Rules. IDAPA 37.03.09.

Theis, C.V., 1935, The Relation between Lowering of the Piezometric Surface and the Rate and Duration of Discharge of a Well Using Groundwater Storage, Trans. Amer. Geophysical Union, v. 16, pp. 519-524.

Attachment A

Mission Creek Water Association
Susceptibility Analysis Worksheet

Ground Water Susceptibility

Public Water System Name : **MISSION CREEK WATER ASSN** Source: **WELL #1**

Public Water System Number : **1110019** 1/28/03 12:28:05 PM

1. System Construction			SCORE			
Drill Date	3/98					
Driller Log Available	YES					
Sanitary Survey (if yes, indicate date of last survey)	YES	1999				
Well meets IDWR construction standards	NO		1			
Wellhead and surface seal maintained	YES		0			
Casing and annular seal extend to low permeability unit	YES		0			
Highest production 100 feet below static water level	YES		0			
Well located outside the 100 year flood plain	YES		0			
Total System Construction Score			**1**			
2. Hydrologic Sensitivity						
Soils are poorly to moderately drained	YES		0			
Vadose zone composed of gravel, fractured rock or unknown	NO		0			
Depth to first water > 300 feet	NO		1			
Aquitard present with > 50 feet cumulative thickness	YES		0			
Total Hydrologic Score			**1**			
3. Potential Contaminant / Land Use - ZONE 1A (Sanitary Setback)			IOC Score	VOC Score	SOC Score	Microbial Score
Land Use Zone 1A	DRYLAND AGRICULTURE		1	1	1	1
Farm chemical use high	NO		0	0	0	
IOC, VOC, SOC, or Microbial sources in Zone 1A	NO		NO	NO	NO	NO
Total Potential Contaminant Source/Land Use Score - Zone 1A			**1**	**1**	**1**	**1**
Potential Contaminant / Land Use - ZONE 1B (3 YR. TOT)						
Contaminant sources present (Number of Sources)	YES		1	1	1	1
(Score = # Sources X 2) 8 Points Maximum			2	2	2	2
Sources of Class II or III leacheable contaminants or Microbials	YES		1	1	1	
4 Points Maximum			1	1	1	
Zone 1B contains or intercepts a Group 1 Area	NO		0	0	0	0
Land use Zone 1B	25 to 50% Non-Irrigated Agricultural Land		1	1	1	1
Total Potential Contaminant Source / Land Use Score - Zone 1B			**4**	**4**	**4**	**3**
Potential Contaminant / Land Use - ZONE II (6 YR. TOT)						
Contaminant Sources Present	NO		0	0	0	
Sources of Class II or III leacheable contaminants or Microbials	YES		0	0	0	
Land Use Zone II	Less than 50% Agricultural Land		0	0	0	
Potential Contaminant Source / Land Use Score - Zone II			**0**	**0**	**0**	**0**
Potential Contaminant / Land Use - ZONE III (10 YR. TOT)						
Contaminant Source Present	YES		1	1	1	
Sources of Class II or III leacheable contaminants or Microbials	YES		1	1	1	
Do irrigated agricultural lands occupy > 50% of Zone	NO		0	0	0	
Total Potential Contaminant Source / Land Use Score - Zone III			**2**	**2**	**2**	**0**
Cumulative Potential Contaminant / Land Use Score			**7**	**7**	**7**	**4**
4. Final Susceptibility Source Score			**3**	**3**	**3**	**4**
5. Final Well Ranking			Low	Low	Low	Low

POTENTIAL CONTAMINANT INVENTORY
LIST OF ACRONYMS AND DEFINITIONS

AST (Aboveground Storage Tanks) – Sites with aboveground storage tanks.

Business Mailing List – This list contains potential contaminant sites identified through a yellow pages database search of standard industry codes (SIC).

CERCLIS – This includes sites considered for listing under the **Comprehensive Environmental Response Compensation and Liability Act (CERCLA)**. CERCLA, more commonly known as ? Superfund? is designed to clean up hazardous waste sites that are on the national priority list (NPL).

Cyanide Site – DEQ permitted and known historical sites/facilities using cyanide.

Dairy – Sites included in the primary contaminant source inventory represent those facilities regulated by Idaho State Department of Agriculture (ISDA) and may range from a few head to several thousand head of milking cows.

Deep Injection Well – Injection wells regulated under the Idaho Department of Water Resources generally for the disposal of stormwater runoff or agricultural field drainage.

Enhanced Inventory – Enhanced inventory locations are potential contaminant source sites added by the water system. These can include new sites not captured during the primary contaminant inventory, or corrected locations for sites not properly located during the primary contaminant inventory. Enhanced inventory sites can also include miscellaneous sites added by the Idaho Department of Environmental Quality (DEQ) during the primary contaminant inventory.

Floodplain – This is a coverage of the 100year floodplains.

Group 1 Sites – These are sites that show elevated levels of contaminants and are not within the priority one areas.

Inorganic Priority Area – Priority one areas where greater than 25% of the wells/springs show constituents higher than primary standards or other health standards.

Landfill – Areas of open and closed municipal and non-municipal landfills.

LUST (Leaking Underground Storage Tank) – Potential contaminant source sites associated with leaking underground storage tanks as regulated under RCRA.

Mines and Quarries – Mines and quarries permitted through the Idaho Department of Lands.)

Nitrate Priority Area – Area where greater than 25% of wells/springs show nitrate values above 5mg/l.

NPDES (National Pollutant Discharge Elimination System) – Sites with NPDES permits. The Clean Water Act requires that any discharge of a pollutant to waters of the United States from a point source must be authorized by an NPDES permit.

Organic Priority Areas – These are any areas where greater than 25 % of wells/springs show levels greater than 1% of the primary standard or other health standards.

Recharge Point – This includes active, proposed, and possible recharge sites on the Snake River Plain.

RICRIS – Site regulated under **Resource Conservation Recovery Act (RCRA)**. RCRA is commonly associated with the cradle to grave management approach for generation, storage, and disposal of hazardous wastes.

SARA Tier II (Superfund Amendments and Reauthorization Act Tier II Facilities) – These sites store certain types and amounts of hazardous materials and must be identified under the Community Right to Know Act.

Toxic Release Inventory (TRI) – The toxic release inventory list was developed as part of the Emergency Planning and Community Right to Know (Community Right to Know) Act passed in 1986. The Community Right to Know Act requires the reporting of any release of a chemical found on the TRI list.

UST (Underground Storage Tank) – Potential contaminant source sites associated with underground storage tanks regulated as regulated under RCRA.

Wastewater Land Applications Sites – These are areas where the land application of municipal or industrial wastewater is permitted by DEQ.

Wellheads – These are drinking water well locations regulated under the Safe Drinking Water Act. They are not treated as potential contaminant sources.

NOTE: Many of the potential contaminant sources were located using a geocoding program where mailing addresses are used to locate a facility. Field verification of potential contaminant sources is an important element of an enhanced inventory.

Where possible, a list of potential contaminant sites unable to be located with geocoding will be provided to water systems to determine if the potential contaminant sources are located within the source water assessment area.